

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : *1-00* BESPAC plc, Norfolk, United Kingdom

Reissue Application
No. : To be assigned

Filed : May 12, 1997

Patent No. : 5,261,601

Serial No. : 07/907,519

Filed : July 6, 1992

Invented by : *1-00 et al*
Calvin J. Ross, Suffolk,
Victor C. Humberstone, Cambridge
both of United Kingdom

For : LIQUID DISPENSING APPARATUS HAVING A
VIBRATING PERFORATE MEMBRANE

REISSUE APPLICATION
DECLARATION AND POWER OF ATTORNEY

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

Assignee of the entire interest in the above-identified
patent hereby declares that:

(1) The undersigned is an authorized officer of the
Assignee of the entire interest of the above-identified
patent and is empowered to act on behalf of the Assignee. As
this reissue application does not seek to enlarge the scope
of the claims of the original patent, the undersigned can

properly execute this Declaration and Power of Attorney pursuant to 37 C.F.R. 1.172.

(2) The above-identified patent is partly invalid by reason of the patentee claiming more than there was a right to claim in the patent.

(a) The error of claiming more than there was right to claim came to light subsequent to a keyword patent database search for patents concerning tapered nozzles wherein U.S. Patent No. 4,871,489 to Ketcham was discovered. This search was prompted by receipt of the Notice of Interference No. 103,400 in which the above-identified patent is involved. The Ketcham patent was not previously known. It was realized after a review of the Ketcham patent that claims 1-3 of the above-identified patent, under one interpretation, could be said to read upon the Ketcham patent disclosure. Based on this realization, the undersigned Assignee of the entire interest in the patent worked diligently towards the filing of this Reissue.

(b) In order to distinctly specify the error of patentee claiming more than there was right to claim in the above-identified patent, Applicant hereby provides the following chart comparing claims 1-3 of the above-identified patent to the Ketcham disclosure.

Claim 1

5,261,601 - ROSS	4,871,489 - KETCHAM
a) 1. A method of dispensing a liquid as an atomised spray comprising the steps of	1(A) Describes method of producing "liquid droplets and/or solid particles derivable from said droplets" (col. 2, lines 65-67).
(b) maintaining the liquid in contact with a rear surface of a vibratable perforate membrane defining an array of holes,	1(B) "when the pressurized liquid enters chamber 10..., the orifice plate tends to deflect upward from the center" (col. 5, lines 2-6 "signal from signal generator 17...passes to the vibratory element 15 which...provides a periodic vibration to orifice plate 13" (col. 4, lines 31-35) "plate 13 containing the array of orifices 12" (col. 4, lines 7,8)
(c) each hole being flared such that the cross-section of each hole narrows in a direction from the rear surface towards a front surface of the membrane, and	1(C) "Several methods are available for producing multi-hole orifice plates according to the present invention...the holes were produced by piercing the stainless steel plate at appropriate locations with a high intensity laser beam. The holes thus produced are slightly conical in shape, one side of the plate having an opening larger than the other side of the plate. In each of the experiments described below the orifice plates were oriented such that the larger openings of the holes faced the liquid feed chamber 10 of the apparatus in FIG. 1." (col. 5, lines 17-27) (See also Fig. 2)
(d) vibrating the membrane such that droplets of the liquid are dispensed through the flared holes as an atomised spray	1(D) "This periodic vibration of orifice plate 13 causes the breakage of the liquid streams passing therethrough into small droplets having a narrow size distribution." (col. 4, lines 35-38)

Claim 2

<p>(a) A method of dispensing a liquid as an atomised spray comprising the steps of</p>	<p>2(A) Describes method of producing "liquid droplets and/or solid particles derivable from said droplets" (col. 2, lines 65-67).</p>
<p>(b) maintaining the liquid in contact with a rear surface of vibratable perforate membrane comprising an electroformed metal sheet defining an array of holes,</p>	<p>2(B) "when the pressurized liquid enters chamber 10..., the orifice plate tends to deflect upward from the center" (col. 5, lines 2-6)</p> <p>"signal from signal generator 17...passes to the vibration element 15 which...provides a periodic vibration to orifice plate 13" (col. 4, lines 31-35)</p> <p>"plate 13 containing the array of orifices 12" (col 4, lines 7,8)</p> <p>"It is believed that other methods may be applicable for forming multi hole orifice plates...such as electro forming" (col. 5, lines 39-42)</p>
<p>(c) each hole being flared such that the cross-section of each hole narrows in a direction from the rear surface towards a front surface of the membrane,</p>	<p>2(c) "The holes thus produced are slightly conical in shape, one side of the plate having an opening larger than the other side of the plate. In each of the experiments described below the orifice plates were oriented such that the larger openings of the holes faced the liquid feed chamber 10 of the apparatus in FIG. 1." (col. 5, lines 17-27) (See also Fig. 2)</p>
<p>(d) the diameter of the holes at the front surface being less than or equal to 20 microns, and</p>	<p>2(D) "For example, the orifice geometry shown in FIG. 2 can be obtained using silicon micromachining techniques. As revealed by FIG. 2, it is preferred that one side of the plate has an opening 1 to 3 microns in diameter while the other side of the plate has an opening 5 to 10 microns in diameter." (col. 5, lines 56-61)</p>
<p>(e) vibrating the membrane such that droplets of the liquid are dispensed through the flared holes as an atomised spray.</p>	<p>2(E) "This periodic vibration of orifice plate 13 causes the breakage of the liquid streams passing therethrough into small droplets having a narrow size distribution." (col. 4, lines 35-38)</p>

Claim 3

<p>(a) A method of dispensing a liquid as an atomised spray comprising the steps of</p>	<p>3(A) Describes method of producing "liquid droplets and/or solid particles derivable from said droplets" (col. 2, lines 65-67).</p>
<p>(b) maintaining the liquid in contact with a rear surface of a perforate membrane defining an array of holes,</p>	<p>3(B) "when the pressurized liquid enters chamber 10..., the orifice plate tends to deflect upward from the center" (col. 5, lines 2-6)</p> <p>"plate 13 containing the array of orifices 12" (col. 4, lines 7, 8)</p>
<p>(c) each hole being flared such that the cross-section of each hole narrows in a direction from the rear surface towards a front surface of the membrane,</p>	<p>3(C) "The holes thus produced are slightly conical in shape, one side of the plate having an opening larger than the other side of the plate. In each of the experiments described below the orifice plates were oriented such that the larger openings of the holes faced the liquid feed chamber 10 of the apparatus in FIG. 1." (col. 5, lines 27-27) (See also Fig. 2)</p>
<p>(d) said membrane being stiffened by means of a grid of support elements, and</p> <p>(e) said membrane having a sheet defining the array of holes and having thickened portions constituting the support elements, and</p>	<p>3(D), (E) "Referring to FIGS. 3a and 3b, for example, an orifice plate 13 having a plurality of orifices 12 therein is disclosed. The orifice plate is supported by a support member 23. Support member 23 contains a plurality of circular cutouts 24 arranged to coincide with the orifice cells 25.... FIGS. 4a and 4b... [reveal] a plurality of linear "cells" 26 located in a thin silicon membrane at the bottom of a "V" trench 27.... [I]t is anticipated that the silicon nozzle will be supported by beams 28 of a relatively high strength material running perpendicular to the linear arrays of orifices." (col. 6, lines 32-56)</p>
<p>(f) vibrating said membrane with the grid of support elements and flared holes such that droplets of the liquid are dispensed through the holes as an atomised spray</p>	<p>3(F) "This periodic vibration of orifice plate 13 causes the breakage of the liquid streams passing therethrough into small droplets having a narrow size distribution." (col. 4, lines 35-38)</p>

(3) Ketcham discloses a method and apparatus to produce liquid droplets by forcing a pressurized liquid stream through a vibrating orifice, the vibrating orifice breaking up the emitting stream into droplets as it passes therethrough.

The amendments made to claims 1-3 place each of them in condition for immediate allowance, over Ketcham, U.S. Patent No. 4,871,489, and all other known prior art. Claims 4-16, which have not been substantively amended in this Reissue Application (claims 4-6 have been amended merely to place them into independent form and claims 7-16 appear in their originally allowed form), each define subject matter which also is allowable over Ketcham as well as all known prior art.

Claim 1 has been amended to clearly distinguish Ketcham. Claim 1 now defines a step of "supplying a non-pressurized liquid to and maintaining the liquid in contact with a rear surface of a vibratable perforate membrane defining an array of holes". It is respectfully submitted that the clause added to claim 1 does not enlarge the scope of the claim and is fully supported by the original patent, i.e., column 7, lines 62-64. Such a step is neither shown nor suggested in Ketcham as the method and the apparatus disclosed therein

clearly supplies and maintains liquid to vibrating orifice plate at a pressurized state. See, i.e., Ketcham, column 3, lines 7-28.

Claim 2 also has been amended to clearly distinguish Ketcham. Claim 2 now defines a step in which "droplets of the liquid are dispensed through the flared holes as an atomised spray solely by the vibrating of the membrane". It is respectfully submitted that the clause added to claim 2 does not enlarge the scope of the claim and is fully supported by the original patent, i.e., column 7, lines 64-68. Such a step is neither shown nor suggested in Ketcham as the method and apparatus disclosed therein forces droplets through the orifices on the orifice plate by pressurizing the liquid stream. Thus, the droplets clearly are not dispensed solely by the vibrating of the orifice plate. See, i.e., Ketcham, column 3, lines 12-13.

Claim 3 also has been amended to clearly distinguish Ketcham. Claim 3 now defines a step in which "the vibrating of said membrane causes the liquid to be emitted from said membrane such that droplets of the liquid are dispensed through the holes as an atomised spray". It is respectfully submitted that the clause added to claim 3 does not enlarge the scope of the claim and is fully supported by the original patent, i.e., column 7, lines 62-68. Such a step is neither

shown nor suggested in Ketcham as the liquid in the method and apparatus disclosed therein clearly is caused to be emitted from the orifice plate by being pressurized. The vibrating of the orifice plate in Ketcham instead only causes the liquid stream, which is passing therethrough due to being pressurized, to break up into liquid droplets. See, i.e., Ketcham, column 3, lines 7-20 and column 4, lines 35-38.

Therefore, claims 1-3, as amended, are allowable over Ketcham under any interpretation thereof.

Claims 4-6 have been amended only to place each of these claims into independent form. These amendments therefore do not enlarge the scope of, and also are clearly supported by, the original patent. It is respectfully submitted that these claims define features which are neither shown nor suggested in Ketcham. For instance, a liquid repellant surface coating is recited in claim 4 as being applied to the front surface of the membrane. Also, claims 5 and 6 further define the liquid respectively recited in these claims to include a pharmaceutical product. Ketcham neither discloses nor suggests liquid repellant surface coatings or liquids containing pharmaceutical products. Thus, claims 4-6, as amended into independent form, are allowable thereover.

Claims 7-16 remain unchanged from their original form. Each of these claims are allowable over Ketcham for defining

features neither shown nor suggested therein. For instance, these claims each define, independently or by dependence, a "liquid supply means for supplying liquid in contact with the rear surface" of the perforate membrane. In accordance with 35 U.S.C. §112, sixth paragraph, it is respectfully submitted that the "liquid supply means" is that which is disclosed in the specification and any equivalents thereof. The specification discloses at, i.e., column 7, lines 62-64, that the supply means is not pressurized. Thus, the "liquid supply means" defined in claims 7-16 is one which is not pressurized. The liquid supply means disclosed in Ketcham clearly is pressurized (see Ketcham, column 3, lines 7-20), and thus, the apparatus defined respectively in claims 7-16 is not shown or suggested thereby. Therefore, claims 7-16 are allowable over Ketcham.

New claim 17 has been added to correct the error of the patentee claiming more than there was a right to and to define the novel and non-obvious features of the invention of the original patent in a manner which clearly distinguishes Ketcham. Claim 17 is fully supported by the original patent at, i.e., column 3, lines 32-38; column 4, lines 44-46; column 4 line 67 to column 5, line 4; and column 8, lines 10-14.

Claim 17 recites all the claim language recited in original claim 1, both the preamble and the steps and then

adds some additional limitations. Thus, the scope of claim 17 is narrower than the scope of original claim 1. Also, the method defined by claim 17 *infringes* original claim 1. Therefore, claim 17 does not enlarge the scope of the originally allowed claims and is properly presented in this Reissue Application. Ketcham neither shows nor suggests a method of dispensing drops from a *hand held* dispenser having a *disposable housing removably engaged with a casing body*, a *mouthpiece*, and a vibratable perforate membrane as is defined by claim 17. Further, Ketcham neither shows nor suggests the step of "*sensing inhalation at the mouthpiece provided on the dispenser*" which also is defined by claim 17 in addition to the "maintaining" and "vibrating" steps recited in original claim 1. Claim 17 therefore clearly defines subject matter patentably distinct from Ketcham.

(5) The error of claiming more than there was a right to claim in the patent arose without any deceptive intention on the part of the Assignee of the entire interest in the above-identified patent.

(6) The undersigned Assignee of the entire interest in the above-identified patent acknowledges the duty to disclose all information known to be material to patentability as defined in 37 C.F.R. 1.56. In accordance with this duty, an Information Disclosure Statement is being concurrently filed

herewith, pursuant to 37 C.F.R. 1.97 And 1.98, to present the Ketcham patent for consideration.

After a further review has been conducted of the numerous patents and publications made of record in the file wrappers of the patents involved in the above noted interference or located due to the above noted interference, a Second Information Disclosure Statement may be forthcoming if any of these documents are determined to be material to patentability of this application.

(7) The undersigned has reviewed and understands the contents of the specification of the reissue application including the description, claims and drawings. Also, it is believed that the above-named inventors are the first and original inventors of the subject matter being claimed and sought in this reissue. Accordingly, the inventorship status indicated on the cover of the Ross Patent No. 5,261,601, which is the subject of this reissue, remains unchanged hereby.

Claimed is: foreign priority benefits under Title 35, United States Code, §119 of the foreign patents listed below which have filing dates before that of the application on which priority is claimed:

Foreign/PCT Application No.	Country	Filed (day/month/year)
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8928086	UK	12/12/89
9017563	UK	8/10/90

Claimed is: the benefit under Title 35, United States Code, §120 of the United States application listed below and, in the event that subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, it is acknowledged that the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application is applicable:

U.S. Application No.	Filing Date	Status
07/620,416	12/3/90	Patented as U.S. Patent No. 5,152,456

I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Joseph A. DeGrandi (17446), Robert G. Weilacher (20531), Richard G. Young (20628), Michael A. Makuch (32263), Dennis C. Rodgers

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Please send all correspondence to Beveridge, DeGrandi,
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659-2811.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed on this X day of May, 1997 at X.

X
Authorized Agent

X
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : BESPAC plc, Norfolk, United Kingdom
Reissue Application
No. : To be assigned
Filed : May 12, 1997
Patent No. : 5,261,601
Serial No. : 07/907,519
Filed : July 6, 1992
For : LIQUID DISPENSING APPARATUS HAVING A
VIBRATING PERFORATE MEMBRANE

ASSENT OF ASSIGNEE

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

BESPAC plc, Assignee of the entire interest in United States Letters Patent No. 5,261,601 hereby assents to the above-identified reissue application and consents to the appointment of the attorneys identified in the REISSUE DECLARATION AND POWER OF ATTORNEY being filed concurrently herewith.

Also being filed concurrently herewith is a Certificate Under 3.73(b) and a Request for an Abstract of Title.

X _____
Date

X _____
Signature

X _____
Name Typed

X _____
Title
of BESPAC plc